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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

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SUBJECT—

TITLE

REPORT OF PINE BEETLE SURVEYS

ON THE

DESCHUTES NATIONAL FOREST

AND ADJACENT TIMBERLANDS

SEASONS OF 1941 AND 1942

By

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April 1943

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Portland, Oregon

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DESCHUTES NATIONAL FOREST AND ADJACENT TIMBERLANDS

SEASONS OF 1941 AND 1942

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ABSTRACT

A. The 1940 and 1941 Infestations (Complete Record)

1. Primary insect - Western pine beetle in ponderosa pine
2. Estimated total pine timber killed -

	No. Trees	Volume (BM)	Volume Per Acre	Percent of Stand
1940	79,000	52,500	45	0.5
1941	89,800	56,600	49	0.6

3. Classification of infestation - Light to heavy epidemic over most of Sisters Area. Normal endemic to light epidemic on rest of forest.
4. Trend of infestation - Sisters Area: Steadily upward since the low of 1937 until 1941, when the losses were only slightly lower than those of 1940.
Other Areas: Upward from the low of 1937 until 1940 when a drop occurred. The 1941 losses were slightly higher than those of 1940.

B. The 1942 Infestation (Partial Record)

1. Primary insect - Western pine beetle in ponderosa pine
2. Probable trend- Sisters Area: Decidedly upward from 1941 level.
Other Areas: Slightly downward from 1941 level.
3. Recommendations-No direct control necessary. Areas of heaviest losses are outside the Deschutes National Forest and will probably be cut-over in a few years. Where possible logging activities in the Sisters Area should be shifted to those stands in the Tumalo and Grandview Units now showing high losses.

REPORT OF PINE BEETLE SURVEYS ON THE DESCHUTES NATIONAL FOREST AND ADJACENT TIMBERLANDS SEASONS OF 1941 AND 1942

The results of two pine beetle surveys, the 11th and 12th consecutive cruises, on the Deschutes National Forest and adjacent timberlands are herewith reported. The 1941 survey was made intermittingly during the period from October 9 to November 28 by a three man crew financed by the Forest Service and directed by Mr. A. J. Jaenicke. This crew was composed of Messrs. F. C. Kinney (Crew Leader), H. A. Dahl, and G. E. Summerside. The 1942 survey was made during the period from September 23 to October 8 by the writer and Messrs. C. E. Bail and R. M. Hudson from the Supervisors office of the Deschutes National Forest. On this survey the transportation costs and the expenses of the writer were paid by the Bureau of Entomology and Plant Quarantine and the salaries and expenses of the other men were paid from regular funds by the Forest Service.

Each survey completed the records of the previous year and secured partial loss data for the current year. A one hundred percent cruise was made each year on fourteen 320-acre check plots totalling 4,480 acres. In 1942 a ten percent cruise of the green stand was made on all plots by the random quarter-acre circular plot method in which the trees were classified by diameter and the California system of rating current tree health. Infestation trends were computed from the loss data and used to formulate general estimates of ponderosa pine mortality for the several infestation areas and units within the reporting area.

As in the past years, the estimates of virgin stand acreage have been corrected through records furnished by the Forest Service.

RESULTS OF THE SURVEYS

The 1941 and 1942 surveys again demonstrated that very obvious differences existed between the character, severity, and trend of pine beetle losses on the Sisters Infestation Area and the rest of the Deschutes National Forest. Because of these differences, the results of recent check plot surveys on the Sisters Area will be discussed separately from the results on the other plots.

Losses in 1940

Sisters Infestation Area - Gross 1940 ponderosa pine losses on the 8 check plots in the Sisters Area varied from 64 to 296 board feet per acre and averaged 174 board feet per acre or 1.08 percent of the stand (Table 1). This heavy loss represented a 30 percent increase over the average 1939 mortality on the same plots. All but two plots showed marked increases in pine beetle activity. The heaviest 1940 infestation was found on the Squaw Ridge plot where the western pine beetle killed trees at the rate of 350 per section which resulted in a mortality of nearly 4 percent of the stand in a single year. This heavy epidemic type of infestation appeared to be restricted to a few sections in the immediate vicinity of the check plot. The losses on the Tumalo and Melvin Butte plots in the Tumalo Unit were fairly heavy in 1940 and represented a moderate epidemic infestation.

Generalized estimates of the gross 1940 ponderosa pine mortality have been prepared for the virgin and cut-over stands on the several units of the Sisters Area (Table 2). These estimates show that approximately 88 board feet per acre or 0.6 percent of the stand were killed on this area in 1940.

Other Infestation Areas - The average 1940 pine beetle losses on the other virgin check plots of the Deschutes National Forest amounted to 59 board feet per acre or 0.33 percent of the stand (Table 1). Except for the moderate epidemic infestation continuing on the Gebhardt Wells plot on the Silver Lake Area, the losses on all other plots were of normal endemic character. On this plot the 1940 losses equalled 124 board feet per acre or 1.70 percent of the stand. Although this represented a .55 percent reduction from the 1939 level it is evident that ponderosa pine mortality in this portion of the forest is still heavy.

The average 1940 losses for all virgin check plots on the Deschutes National Forest equalled 124 board feet per acre or 0.74 percent of the stand. This represented a 3 percent increase over the average 1939 losses for the same 14 plots (Table 1).

An estimate of the 1940 losses on the entire reporting area (Table 2), including both virgin and cut-over lands, shows that a gross mortality of 45 board feet per acre or 0.5 percent of the stand occurred in that year. Because several units of this forest have been largely cut-over, the aggregate 1940 losses are lower than those of 1939 even though the trend of the infestation was slightly higher than that of 1939. Losses were of a normal endemic or of a light epidemic character at the higher elevations but were of moderate or heavy epidemic proportions at some of the lower elevations and especially so in the bodies of fringe timber.

Losses in 1941

Sisters Infestation Area - The gross 1941 pine beetle losses on 5 of the 8 virgin check plots in the Sisters Area were lower than those of the previous year; however, the losses on the remaining 3 plots increased markedly above the 1940 level so that the average 1941 volume losses for the area as a whole were almost the same as those of 1940 (Table 1). The 1941 losses varied from 47 to 455 board feet per acre and averaged 173 board feet per acre or 1.08 percent of the stand. The Squaw Ridge plot again showed the highest mortality, with the half section losses totalling 455 board feet per acre or 6.27 percent of the stand for a single year. These losses were 53 percent higher than those of 1940. The Tumalo and Melvin Butte plots also showed decided increases in 1941, the losses being 36 percent higher than the previous year. Estimates of gross losses for all stands on the Sisters Area (Table 3) based largely on the check plot data, indicate a 1941 mortality of 104 board feet per acre or 1.0 percent of the stand. The accompanying map shows the estimated degree of the 1941 infestation on the virgin stands of ponderosa pine by units and areas. As pointed out above, there were two centers of heavy epidemic losses in 1941, one on the Grandview Unit and the other on the Tumalo Unit of the Sisters Area. Practically all of these losses were outside the National Forest boundary in areas likely to be logged in a short time. Inside the Forest, the condition of the stands in 1941 was generally favorable.

Other Infestation Areas - The 1941 pine beetle losses on the other virgin check plots of the Deschutes National Forest averaged 62 board feet per acre or 0.35 percent of the stand (Table 1). These losses were 5 percent higher than those of 1940 but were not considered serious except for the continued high losses on the Gebhardt Wells plot in the Silver Lake Area. On this plot the 1941 losses were 8 percent higher than in 1940 and equalled 134 board feet per acre or 1.85 percent of the stand.

Generalized estimates of the 1941 mortality for the Forest as a whole (Table 3) including virgin and cut-over lands, show that approximately 49 board feet per acre or 0.6 percent of the stand were killed in that year. These losses were not serious except as outlined above. The estimated degree of the 1941 losses for the Deschutes National Forest is shown on the enclosed map.

Infestation Trend

Sisters Infestation Area - The trend of pine beetle losses on the Sisters Area since 1931, as shown in figure 2, has been interesting. Pine beetles were causing heavy losses when these surveys were inaugurated in 1931 and caused even heavier losses in 1932. During the next two years the trend was noticeably downward but in 1935 it turned sharply upward and fairly heavy losses were again recorded.

In 1936 the trend turned down and an all-time low was reached in 1937. From this low, the losses have increased very steadily each year until 1941 when they were only slightly lower than those of the previous year. The estimated losses of 202 board feet per acre for 1942 are considerably higher than those of 1941 and are equal to those of the peak year of 1932. In this connection it should be mentioned that the average of 172 board feet per acre, found on the Sisters check plots in October, represented approximately 78 percent of the probable losses for the year and came within 1 board foot of equalling the actual average for 1941. Thus it is evident that the trend of the infestation will be upward from the 1941 level.

Other Infestation Areas - The trend of pine beetle losses on the other check plots of the Deschutes National Forest has differed from that on the Sisters Area in several respects (Figure 2). The losses on the plots outside the Sisters Area declined in 1932 and were not serious until 1934 and 1935 when marked increases occurred. Following this flare-up, the losses declined to a very low stage in 1937, increased in 1938 and 1939 only to drop off again in 1940. The 1941 losses on these plots were slightly higher than in 1940. From the partially completed 1942 survey data it is probable that the trend of pine beetle losses outside the Sisters Area turned downward in 1942, for the estimated losses are a trifle lower than those of 1941.

CONTROL WORK

During the winter of 1940-1941, another "fell-peel-burn" control project was undertaken by the Forest Service on portions of the Sisters Area. The spotting was done by experienced three-man crews and the treating was conducted by CCC enrollees from Camp Sisters. The statistics for this maintenance project were as follows:

Acreage covered	=	65,000
Number of trees treated	=	4,008
Board foot volume treated	=	3,350,000
Total cost	=	$15,055

RECOMMENDATIONS

Two centers of heavy epidemic losses, mostly outside the boundary of the Deschutes National Forest on the Sisters Area, existed in 1941 and were still evident in 1942. However, no direct control recommendations have been made for the reason that these centers of infestation are adjacent to active logging operations and will probably be cut-over within a few years.

In order to reduce this wasteful depletion and to utilize the high value trees now falling prey to the western pine beetle, it is recommended that, wherever possible, logging operations be shifted to those portions of the Tumalo and Grandview Units of the Sisters Area now showing these heavy losses. It is further recommended that the situation on these units be very carefully checked in 1943 and, if the level of high losses is maintained, definite steps should be taken to curtail this heavy mortality.

Table 1. Pine timber killed by bark beetles on virgin check plots in 1940 and 1941 — Deschutes National Forest and Adjacent Timberlands.

Area And Check Plot	Ponderosa Pine Type		Year	Gross Losses				
					Volume (Bd. Ft.)			
	Acres	Volume (Bd. Ft.)		No. Trees	Total	Per Acre	Percent of Stand	Ratio to Previous Year
SISTERS								
Allingham	320	5,600,000	1940	37	29,060	91	.52	.93
		5,600,000	1941	15	14,930	47	.27	.51
Jack Creek	320	8,000,000	1940	58	54,630	171	.68	1.85
		8,000,000	1941	20	25,340	79	.32	.46
Black Butte	320	9,500,000	1940	22	20,500	64	.22	1.32
		9,500,000	1941	15	15,440	48	.16	.75
Cold Spring	320	4,800,000	1940	79	59,660	192	1.24	1.06
		4,770,000	1941	46	30,550	95	.62	.51
Prairie Farm	320	4,800,000	1940	55	55,160	172	1.15	1.22
		4,780,000	1941	38	34,130	107	.71	.62
Squaw Ridge	320	2,400,000	1940	175	94,790	296	3.94	1.93
		2,320,000	1941	271	145,440	455	6.27	1.53
Melvin Butte	320	3,300,000	1940	103	71,560	224	2.16	1.92
		3,280,000	1941	147	101,150	316	3.08	1.42
Tumalo	320	2,600,000	1940	80	59,090	184	2.27	.76
		2,580,000	1941	130	76,400	249	2.86	1.30
TOTAL	2,560	41,000,000	1940	609	444,450	173	1.08	1.30
SISTERS AREA	2,560	40,830,000	1941	682	443,380	173	1.08	1.00
CRESCENT								
Pringle Falls	320	5,130,000	1940	16	19,280	60	.38	1.26
		5,130,000	1941	13	16,120	50	.31	.84
Black Rock	320	5,400,000	1940	11	14,050	44	.26	.35
		5,400,000	1941	17	15,260	49	.28	1.08
Davis Mt.	320	7,360,000	1940	9	6,070	19	.08	.36
		7,360,000	1941	13	17,200	54	.22	2.84
Lava Rock	320	8,750,000	1940	27	25,020	78	.29	.94
		8,750,000	1941	27	21,340	67	.24	.85
TOTAL	1,280	26,640,000	1940	63	64,420	50	.24	.65
CRESCENT AREA	1,280	26,640,000	1941	70	69,920	555	.26	1.08
WEST PAULINA								
Crescent	320	5,430,000	1940	14	9,070	28	.17	.29
		5,430,000	1941	10	6,090	19	.11	.67
SILVER LAKE								
Gebhardt Wells	320	2,340,000	1940	63	39,690	124	1.70	.55
		2,320,000	1941	62	42,950	134	1.85	1.08
TOTALS WITHOUT	1,920	34,410,000	1940	140	113,180	59	.33	.56
SISTERS AREA	1,920	34,390,000	1941	142	118,960	62	.35	1.05
TOTAL	4,480	75,410,000	1940	749	557,630	124	.74	1.03
ALL PLOTS	4,480	75,220,000	1941	824	562,340	125	.75	1.01

Table 2. Estimated insect-caused ponderosa pine mortality in 1940—Deschutes National Forest and Adjacent Timberlands.

Infestation Area and Unit	Ponderosa Pine Type			1940 Gross Losses				
	Acreage		Volume M.B.M.	Trees		Volume		
	Virgin	Total		Total	Per Section	Total M.B.M.	Per Acre	% of Stand
SISTERS								
Metolius	67,400	70,000	789,000	5,200	48	4,600	65	.6
Grandview	88,000	119,000	1,000,000	21,400	115	13,000	109	1.3
McKenzie	70,900	80,000	1,149,000	6,100	49	5,200	65	.5
Tumalo	52,200	71,000	606,000	9,800	88	7,000	99	1.2
Area Total	278,500	340,000	3,544,000	42,500	80	29,800	88	.8
PANHANDLE								
Panhandle	23,200	68,000	30,000	2,500	24	500	7	1.7
Orphan Butte	10,900	38,000	120,000	1,500	25	600	16	.5
Area Total	34,100	106,000	150,000	4,000	24	1,100	10	.7
CRESCENT								
Davis	53,000	55,000	885,000	2,200	26	1,400	25	.2
Pringle Falls	25,800	31,000	355,000	2,500	52	1,900	61	.5
Fall River	60,000	62,000	833,000	4,200	43	3,600	58	.4
Big Spring	7,800	54,000	100,000	1,600	19	400	8	.4
Odell	34,600	48,000	507,000	2,000	27	1,800	38	.4
Area Total	181,200	250,000	2,680,000	12,500	32	9,100	36	.3
WEST PAULINA								
Ava Butte	6,000	56,000	69,000	2,100	24	500	9	.7
Conley Butte	28,000	66,000	493,000	2,200	22	1,500	23	.3
Crescent	41,700	44,000	562,000	2,300	34	1,300	30	.3
Summit Stage	39,000	39,000	506,000	3,000	49	2,200	56	.4
Area Total	114,700	205,000	1,630,000	9,600	30	5,500	27	.3
SILVERLAKE								
Pot Holes	21,000	22,000	235,000	3,000	87	1,900	86	.8
BEAVER MARSH								
Chemult	7,300	26,000	156,000	1,000	25	600	23	.4
CABIN LAKE								
Cabin Lake	25,500	59,000	432,000	1,400	15	1,000	17	.2
16 Butte	15,600	25,000	184,000	1,000	26	800	32	.4
Fox Butte	7,700	51,000	170,000	1,100	14	600	12	.4
China Hot	3,000	8,000	86,000	700	56	500	63	.6
Pine Mt.	5,000	6,000	62,000	600	64	500	83	.8
Flat Top	20,800	63,000	446,000	1,600	16	1,100	18	.2
Area Total	77,600	212,000	1,380,000	6,400	19	4,500	21	.3
FOREST TOTAL	714,400	1,161,000	9,775,000	79,000	44	52,500	45	.5

Table 3. Estimated insect-caused ponderosa pine mortality in 1941—Deschutes National Forest and adjacent timberlands.

Infestation Area and Unit	Ponderosa Pine Type			1941 Gross Losses				
	Acreage		Volume M.B.M.	Trees		Volume		
	Virgin	Total		Total	Per Section	Total M.B.M.	Per Acre	% of Stand
SISTERS								
Metolius	67,400	70,000	789,000	2,100	20	2,300	33	.3
Grandview	86,000	119,000	995,000	33,600	180	19,500	164	2.0
McKenzie	70,000	80,000	1,149,000	4,500	36	3,000	38	.3
Tumalo	52,200	71,000	603,000	16,500	148	10,600	149	1.8
Area Total	275,600	340,000	3,536,000	56,700	107	35,400	104	1.0
PANHANDLE								
Panhandle	8,000	68,000	29,000	2,200	21	400	6	1.5
Orphan Butte	8,000	38,000	120,000	1,500	25	600	16	.5
Area Total	16,000	106,000	149,000	3,700	22	1,000	9	.7
CRESCENT								
Davis	52,500	55,000	885,000	2,100	24	2,200	40	.3
Pringle Falls	25,800	31,000	355,000	1,300	27	1,600	52	.5
Fall River	59,700	62,000	893,000	4,000	41	3,100	50	.4
Big Spring	4,000	54,000	100,000	1,600	19	400	8	.4
Odell	33,000	48,000	506,000	2,000	27	1,700	35	.3
Area Total	175,000	250,000	2,679,000	11,000	26	9,000	36	.4
WEST PAULINA								
Lava Butte	6,000	56,000	69,000	2,000	23	500	9	.7
Finley Butte	26,000	66,000	492,000	2,100	20	1,300	20	.3
Crescent	41,700	44,000	562,000	1,800	26	1,100	25	.2
Summit Stage	39,000	39,000	506,000	2,500	41	1,500	38	.3
Area Total	112,700	205,000	1,629,000	8,400	26	4,400	21	.3
CABIN LAKE								
Cabin Lake	25,000	59,000	432,000	1,400	15	1,000	17	.2
16 Butte	13,000	25,000	183,000	900	23	700	28	.4
Fox Butte	0	51,000	170,000	1,000	13	500	10	.3
China Hat	1,000	8,000	85,000	700	56	500	63	.6
Pine Mt.	5,000	6,000	62,000	500	53	400	67	.6
Flat Top	19,000	63,000	445,000	1,500	15	1,000	16	.2
Area Total	63,000	212,000	1,377,000	6,000	18	4,100	19	.3
SILVER LAKE								
Pot Holes	21,000	22,000	234,000	3,000	87	2,100	95	.9
BEAVER MARSH								
Chemult	7,000	26,000	156,000	1,000	25	600	23	.4
FOREST TOTAL	670,000	1,161,000	9,760,000	89,800	50	56,600	49	.6

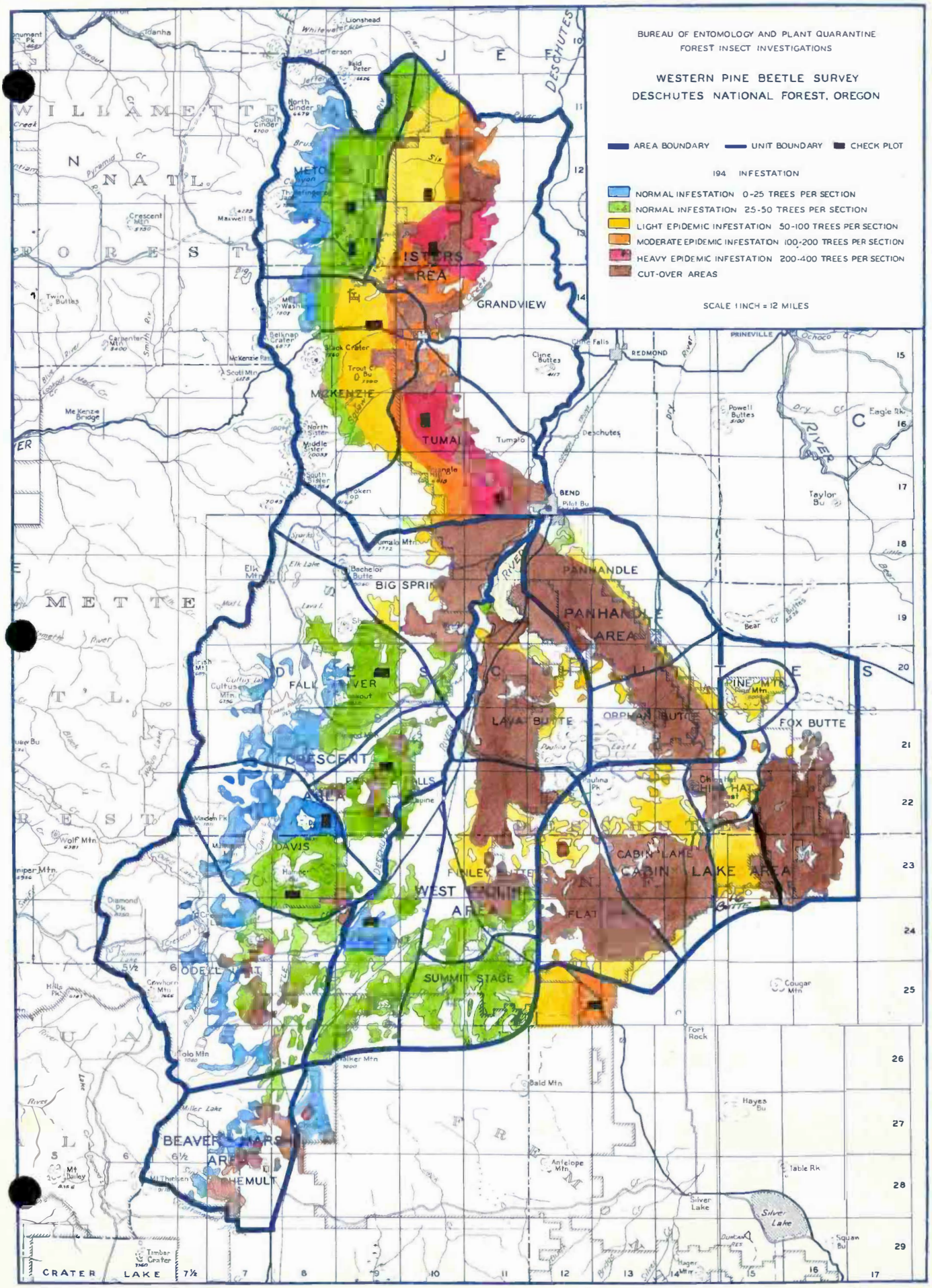
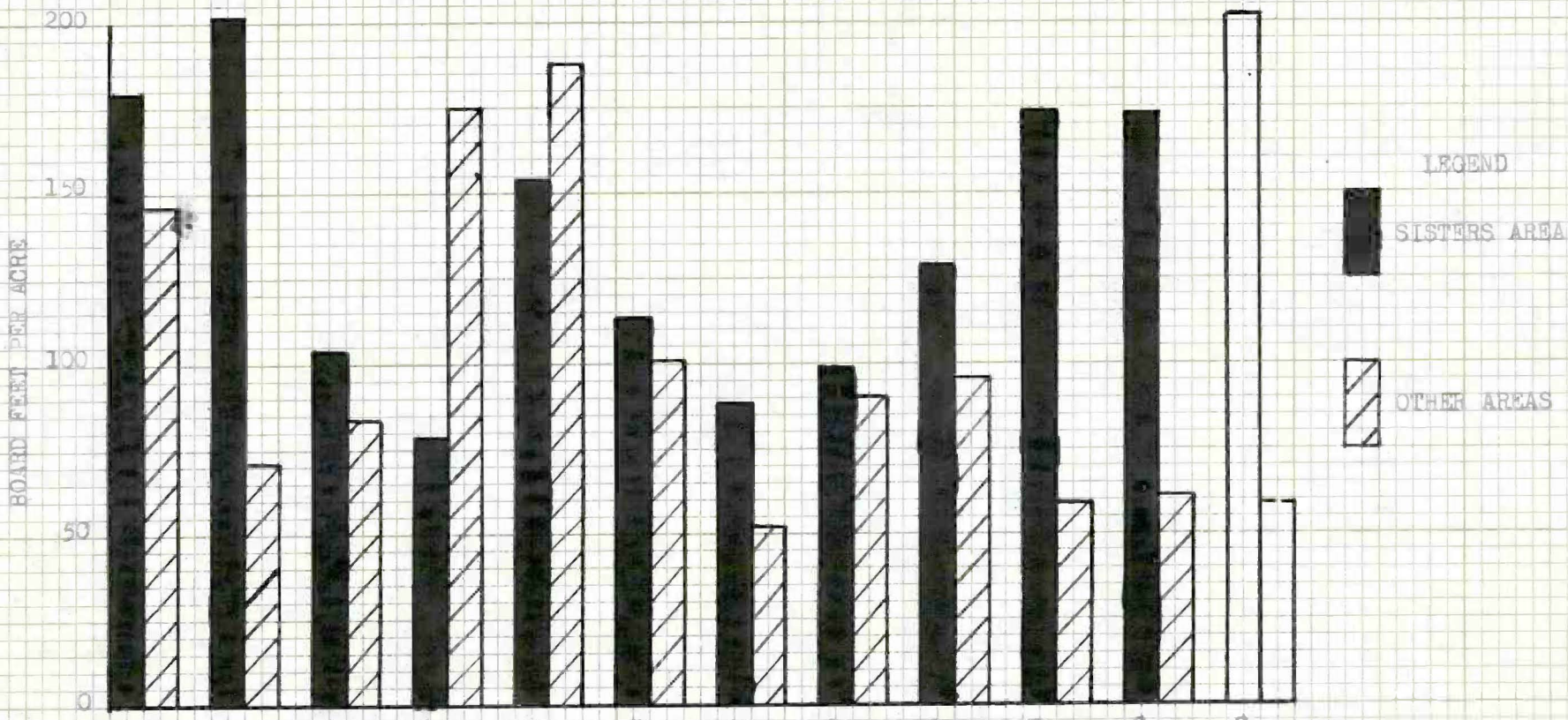

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT INVESTIGATIONS
WESTERN PINE BEETLE SURVEY
DESCHUTES NATIONAL FOREST, OREGON
AREA BOUNDARY
UNIT BOUNDARY
CHECK PLOT
194 INFESTATION
NORMAL INFESTATION 0-25 TREES PER SECTION
NORMAL INFESTATION 25-50 TREES PER SECTION
LIGHT EPIDEMIC INFESTATION 50-100 TREES PER SECTION
MODERATE EPIDEMIC INFESTATION 100-200 TREES PER SECTION
HEAVY EPIDEMIC INFESTATION 200-400 TREES PER SECTION
CUT-OVER AREAS
SCALE 1 INCH = 12 MILES
GRANDVIEW
TUMALO
BEND
REDMOND
PRINEVILLE
PANHANDLE
PANHANDLE AREA
FALL RIVER
CRESCENT
DAVIS
LAVA BUTTE
ORPHAN BUTTE
FOX BUTTE
PINE MTN.
CABIN LAKE
CABIN LAKE AREA
WEST
AREA
FLAT
SUMMIT STAGE
BEAVER MARSH
AREA
CRATER LAKE
Lionshead
Mt. Jefferson
Bald Peter
North Cinder
South Cinder
Crescent Mtn.
Twin Buttes
Carpenters Mtn.
McKenzie Pass
Scott Mtn.
McKenzie Bridge
Belknap Crater
Black Crater
Trout Cr Bu
North Sister
Middle Sister
South Sister
Broken Top
Cline Falls
Cline Buttes
Powell Buttes
Eagle Rk.
Taylor Bu
Tumalo Mtn.
Elk Mtn.
Bachelor Butte
Lava L.
Irish Mtn.
Cultus Mtn.
Cultus Lake
Wolf Mtn.
Maiden Pk.
Diamond Pk.
Hamner
Finley Butte
Paulina Pk.
East L.
Chief Hat
Cougar Mtn.
Fort Rock
Bald Mtn.
Hayes Bu
Table Rk.
Antelope Mtn.
Silver Lake
Squaw Bu
Hager Mtn.
Walker Mtn.
Holo Mtn.
Miller Lake
Mt. Bailey
Mt. Thielsen
Timber Crater
Cowhorn Mtn.
Hills Pk.
Deschutes
Tumalo
Dry Cr.
Little Bear
Bear Cr.

FIGURE 2

COMPARISON OF THE TREND OF WESTERN PINE BEETLE LOSSES
ON THE CHECK PLOTS OF THE SISTERS AREA AND ON OTHER AREAS
OF THE
DESCHUTES NATIONAL FOREST


200
150
100
50
0
BOARD FEET PER ACRE
LEGEND
SISTERS AREA
OTHER AREAS
SISTERS AREA 6 6 6 6 7 7 9 9 9 9 8 8
OTHER AREAS 2 9 9 8 9 9 16 18 18 13 6 6
NUMBER OF CHECK PLOTS
1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 (EST.)
YEARS